

6.1 What does DNA look like?

I. DNA - deoxyribonucleic acid

A. Chromosomes are made up of proteins + DNA

1. DNA determines inherited characteristics because genes are made up of DNA

II Pieces of the Puzzle

A. Genes must be able to give instructions for building and maintaining cells and be able to be copied each time a cell divides

B. Nucleotides = the subunits of DNA

1. A nucleotide consists of a sugar, phosphate, and a base
2. 4 bases that make up four unique nucleotides
 - a. Adenine (A), Guanine (G), Thymine (T), Cytosine (C)

C. Chargaff's Rule

1. Erwin Chargaff found that A always binds with T and G with C

D. Rosalind Franklin found that DNA has a spiral shape

E. Watson + Crick

1. discovered "double helix" of DNA, looked like a long twisted ladder

III DNA's double structure

A. Two sides of DNA "ladder" made up of sugar parts and phosphate parts

1. Rungs of ladder made of 2 bases (forms a pair) (A-T or G-C)

B. Making copies of DNA

1. Pairing of bases allows cells to replicate (make copies of DNA)
 - a. pairs of bases are complementary to each other

2. Copies are made by DNA molecule being split down the middle making a single strand of DNA that is used for a pattern to make new complementary strands and a new DNA molecule

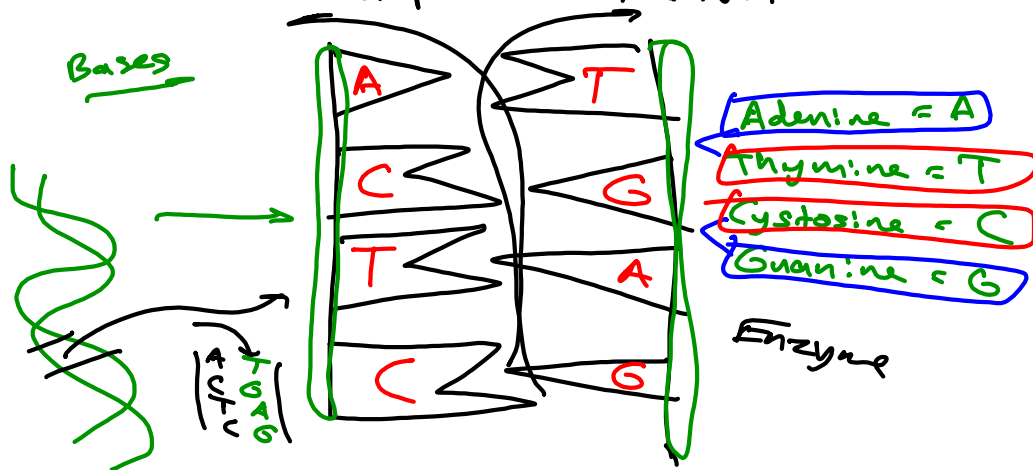
3. Copies are made every time a cell divides
 - a. DNA unwinds, it copies (or replicates), and recombines with bases to make new DNA

Beltringer

→ What is a gene?

→ What does DNA look like?

Draw a picture of DNA.



Intro to Genes & DNA Review

Grade: 7th

Subject: Life Science

Date:

- 1 The nucleotide that is the complement to guanine.

Cytosine

2 A subunit of DNA that consists of a sugar, a phosphate, and a nitrogenous base is RNA.

True

False

3 What letter represents the four bases?

A A,B,C,D

B W,X,Y,Z

C A,T,G,C

D E,Y,A,O

4 Using X-ray diffraction, what did Rosalind Franklin show the shape of DNA to be?

- A a circle
- B a square
- C a line
- D a spiral

5 Watson and Crick built a DNA model like a ...

- A long twisted ladder
- B piece of twine
- C straight line
- D pyramid

6 The sides of the DNA "ladder" are made of

- A guanine and thymine
- B sugar and phosphate**
- C adenine and cytosine
- D helixes and twists

7 The "rungs" of the DNA ladder are ...

- A a pair of bases**
- B a pair of sugars
- C a pair of phosphates
- D a set of proteins

8 To be copied, a DNA molecule splits ...

- A across the top
- B down the middle**
- C along the sides
- D along the phosphates

- 6.2 How DNA works
- I. Unraveling DNA → See Figure 1, p. 148-149
- A. DNA is found in all organisms, including bacteria, plants, + humans
1. The structure of DNA to hold information
 2. A gene consists of a string of nucleotides that give the cell information about how to make a specific trait
- II. Genes and Proteins
- A. A long string of amino acids form proteins; thus each gene (which code for amino acids) generally is a set of instructions for making a protein
- B. Proteins + traits
1. Proteins are found throughout cells and cause most of the differences in traits of organisms
- C. Help from RNA
1. Another type of molecule that helps make proteins is RNA, ribonucleic acid
 - a. RNA reads DNA to determine code for amino acids
- D. The making of a protein
1. First, a copy of one side of DNA is made
 2. Then a mirrorlike copy of the DNA segment is made out of RNA
 - a. Called a messenger RNA (mRNA)
 - b. Moves out of nucleus into cytoplasm
 3. mRNA then goes through the protein assembly line (ribosomes)
 4. the mRNA is fed through the ribosome 3 base nucleotides at a time
 - a. transfer RNA (tRNA) then reads the 3 base units to code for an amino acid which codes for a protein

III Changes in Genes

- A. A mutation, a change in the nucleotide-base sequence of a gene or section of DNA, occurs due to three processes
1. Insertion- extra base added
 2. Deletion- a base is deleted
 3. Substitution- a wrong based is used

B. Even though mutations occur they are generally fixed / repaired

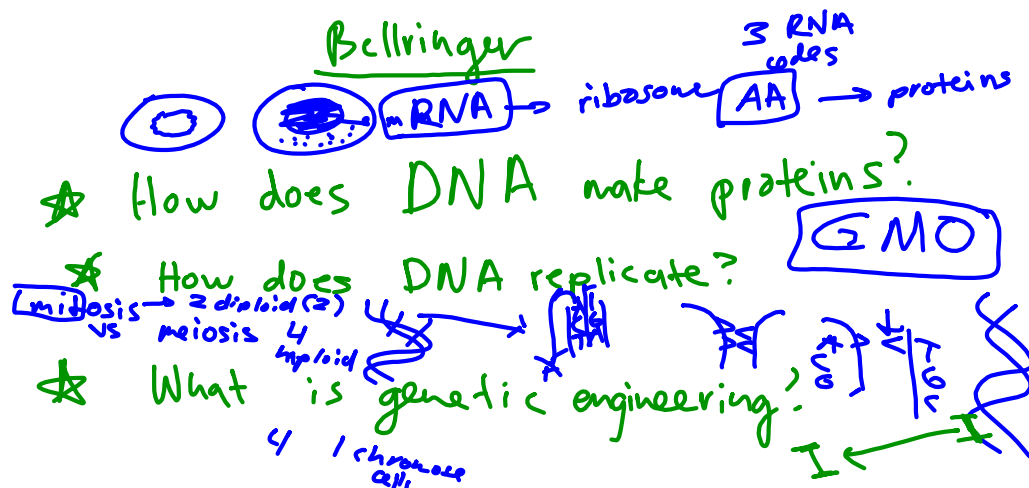
C. Mutagens - a chemical or physical agent that causes a DNA mutation

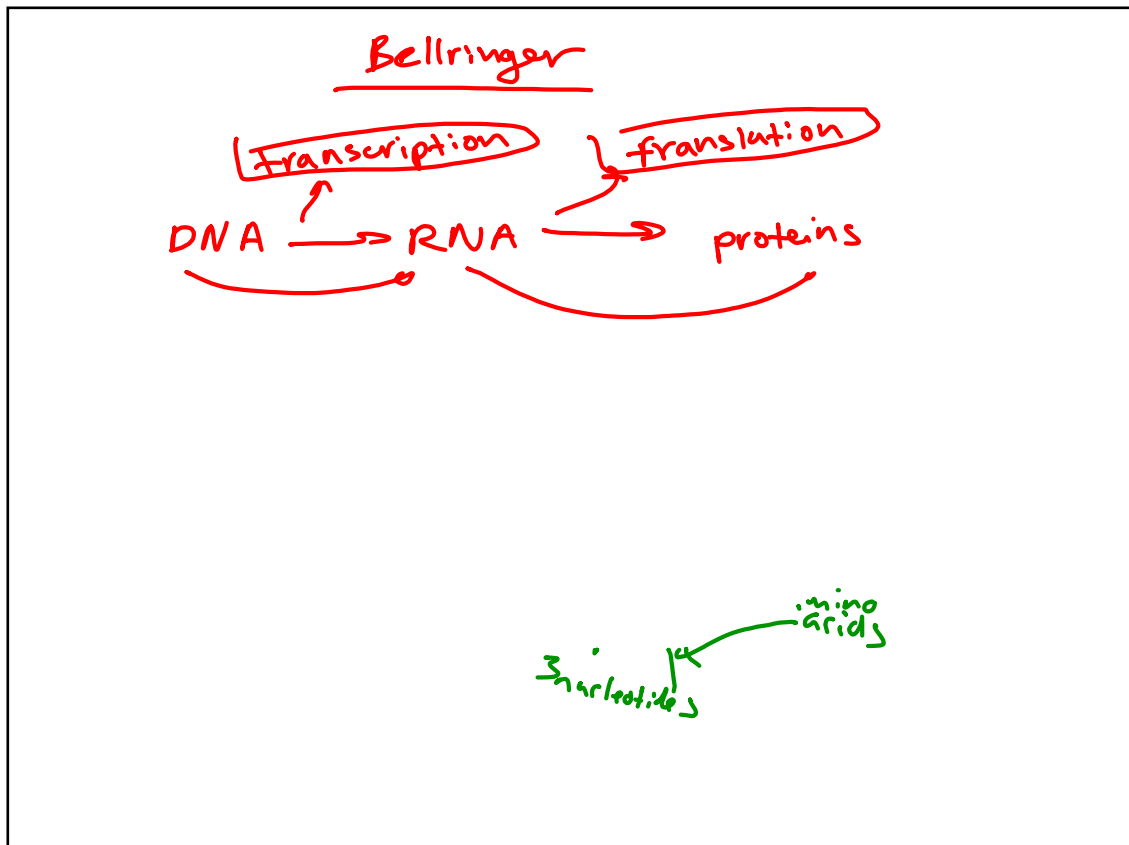
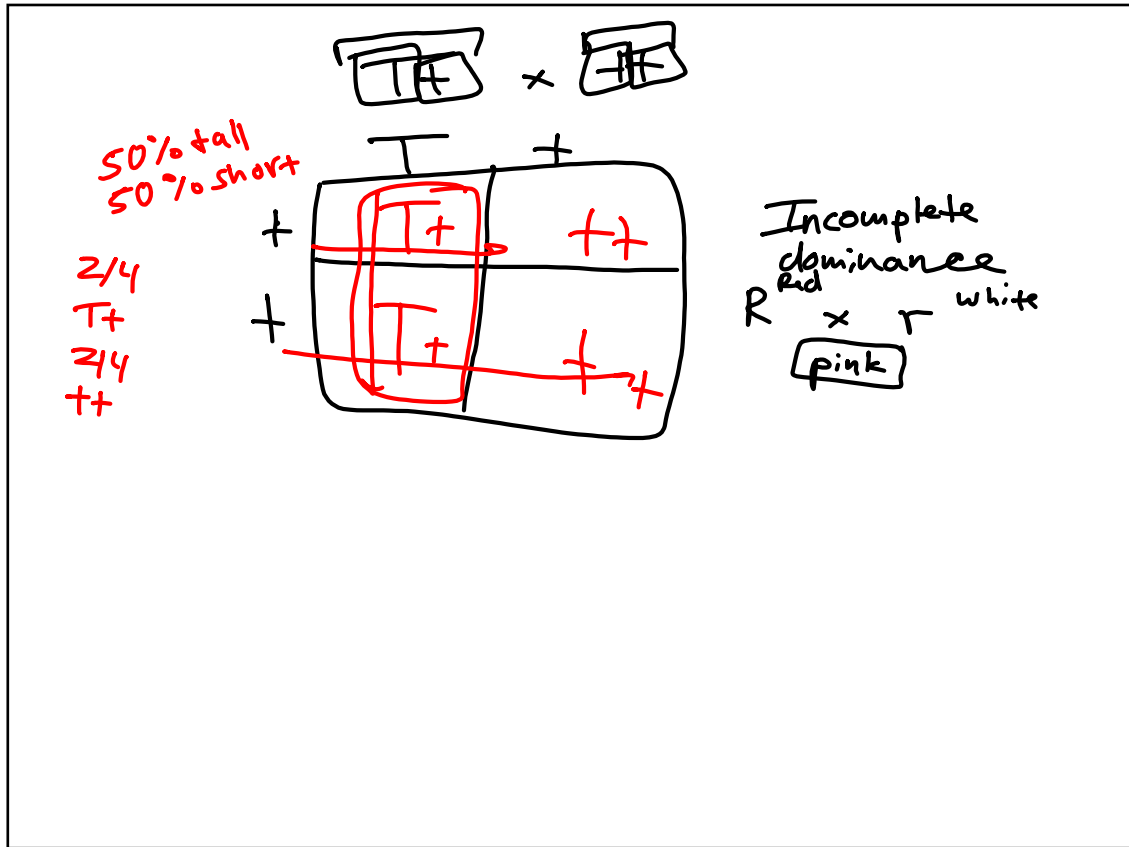
IV Examples of a substitution

- A. A simple change in an amino acid can lead to sickle cell disease

V Uses of genetic knowledge

- A. Genetic engineering - manipulation of an individual gene of an organism
- B. Gene identification
1. DNA fingerprinting - identifies the unique patterns in an individuals DNA
 2. Cloning - an organism that is an exact DNA copy of another organism





DNA to Proteins Review

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- 1 Ribonucleic acid that copies DNA and goes to the ribosome is a _____

mRNA

2 The cell organelle where protein is synthesized is the ribosome

3 A type of RNA that delivers amino acids to make a protein is a tRNA

4 A change in a DNA sequence that can be harmful, helpful or make no difference is a mutation

5 A string of nucleotides that has instructions for a certain trait is a ____.

A cell

B ribonucleic acid (RNA)

C gene

D chromosome

6 As messenger RNA is fed through the ribosome it is matched with ____.

- A DNA
- B transfer RNA**
- C cells
- D proteins

7 Three bases code for one ____.

- A cell
- B DNA
- C protein
- D amino acid**

8 A tobacco plant with a firefly gene that makes it glow is an example of _____.

- A DNA fingerprinting
- B genetic engineering
- C protein science
- D firefly breeding

9 In what type of mutation is one base left out?

- A substitution
- B deletion
- C insertion
- D cell

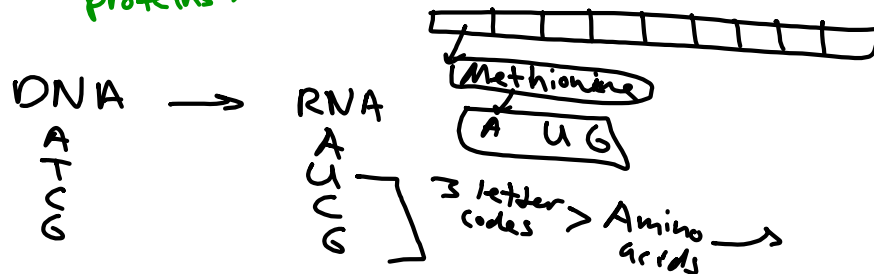
10 Which best expresses the relationship between genes and DNA?

- A Genes contain DNA
- B DNA destroys genes
- C Both contain chromosomes
- D they are unrelated

Bellringer

→ What is "genetic engineering"?

⇒ What is RNA's role in making proteins?

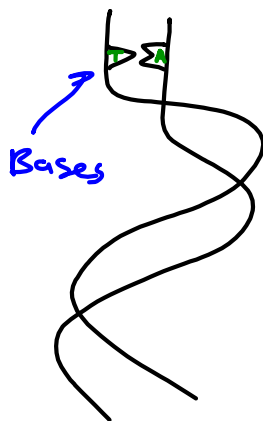


Bellringer

→ Who had a bigger contribution to DNA research: Rosalind Franklin or Watson + Crick?

Explain your reasoning.

ATGC



sugar
phosphate

A - Red
T - Purple
G - Green
C - Yellow

Genes and Proteins Review

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1 What are chromosomes made of?

- A inherited characteristics
- B generations
- C cells and structures
- ☒ D protein and DNA

2 What is the name of the material that determines inherited characteristics?

- A deoxyribonucleic acid (DNA)
- B ribosome
- C RNA
- D amino acid

3 The subunits that make up DNA are called _____.

- A phosphates
- B nucleotides
- C amino acids
- D bases

4 Rosalind Franklin used a process known as x-ray diffraction to make images of DNA molecules.

True

False

.

5 What four letters stand for the four types of bases in DNA?

A, T, G, C

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.

.

6 According to Chargaff's rules, the amount of _____ always equals the amount of thymine.

T

A Adenine

7 According to Chargaff's rules, the amount of _____ always equals the amount of guanine.

Cytosine

8 The twisted ladder shape of DNA is called a(n)

_____.

double helix

9 What shape does DNA take in a cell that lacks a nucleus?

A a loose loop

B a structure

C a tight chain

D a protein

10 What are the structures that strands of DNA are bundled into a cell with a nucleus called?

A nucleotides

B loose loops

C chromosomes

D tight chains

11 A string of nucleotides that give the cell information about a certain trait is known as a(n) _____.

gene

12 How many chromosomes does a human cell have before division?

46

13 Groups of three bases are the codes for specific amino acids.

True

False

14 A long string of amino acids forms a(n) _____.

protein

15 The type of mutation that causes sickle cell anemia is called a _____.

substitution

?

16 The stage at which a DNA molecule is split down the middle is called replication.

True

False

17 The type of mutation where a base is added to a gene is a substitution.

True

False